VOL. XIV. October, 1889. No. 9

THE
Journal
OF
Nervous and Mental Disease.

Original Articles.

THE SOMEWHAT FREQUENT OCCURRENCE OF DEGENERATIVE DISEASES OF THE NERVOUS SYSTEM (TABES DORSALIS AND DISSEMINATED SCLEROSIS) IN PERSONS SUFFERING FROM MALARIA.[1]

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FOR some time past my attention has been attracted to the number of patients suffering from degenerative diseases of the central nervous system, preferably tabes dorsalis and disseminated sclerosis, who had at an earlier period contracted intermittent fever *and were still subject to malarial attacks*. More lately I have noted all cases coming under my observation where the two diseases coexisted, and have now notes of a number of cases which I will refer to in this paper.

For myself, though I do not think this evidence can be taken as decisive of an ætiological law, or at least as showing any great frequency of a connection of this sort, yet I give it with the hope of eliciting the personal experience of others and of drawing attention to the subject for purposes of future observation.

We in Massachusetts do not have many opportunities of seeing malarial fever, and therefore I have hoped that those

[1] Read at the annual meeting of the American Neurological Association, June, 1889.

of you who come from malarial districts may be able to confirm or otherwise explain my own limited observations.

I am further led to introduce the subject here because there are certain peculiar and practical considerations connected with it which render it one of great importance and make it desirable that the question should be settled if possible. To them I shall refer later.

It is not necessary before a society of this kind to describe the cases *in extenso*, a brief reference to the salient features of each will be sufficient, dividing the cases into natural groups.

GROUP I.—TABES DORSALIS.

Case I., M. H. R.—Typical case of locomotor ataxia, knee-jerks absent—static and locomotor ataxy—no appreciable objective anæsthesia, but decided loss of muscular sense in legs, Argyll-Robertson's pupils, paresis of bladder, lightning pains, subjective numbness of hands and feet, etc.

History.—First malarial attack in 1862. Has had similar attacks ever since and still continues to have them. He never goes a month without an attack, and sometimes they recur at intervals of a week or fortnight. There is one very suggestive thing about these malarial attacks, and that is the way in which they begin. The first symptom, as the patient describes them, is shooting-pains down his legs and arms into his fingers, accompanied by a terrible dull feeling in his head. These pains "are very severe, just like a knife or like lightning going through a cloud." Then in the course of half a day or a day the rigor comes on. "Sometimes," to continue his phraseology, "you would think he would shake the bed to pieces." Then fever comes on; he feels as if he would burn up. This in turn is succeeded by cold sweating, and he is left so weak he can hardly stand. In short, he has typical attacks of malaria, always preceded by tabetic crises. He is generally disabled for a week or two. On the following day, or third day or so, he is liable to a second attack and often a third. After the chill comes on the lightning pains are ameliorated,

but his legs then feel numb and dead. For awhile his legs are so clumsy he can't go up and down stairs; then he improves till the next attack.

As to the time of development of the spinal symptoms, the lightning pains first came on shortly after the first attack of chills and fever—say six to eight months. They have increased in severity ever since. The clumsiness of legs was first noticed twelve to fifteen years ago in the following way: As a matter of sport he was trying to jump with others on the sand, two hops and a jump. On the second hop he "fell right down, and couldn't jump at all, and so discovered that his legs were clumsy and 'dead.'"

Strongly denies syphilis.

The first symptom noticed by the patient in this case was the tabetic pains, six to eight months after the first malarial attack, but it is probable that if the patient had been carefully examined, other evidences of tabes, such as diminished knee-jerks, would have been discovered at an earlier period. The association of the subsequent malarial attacks, with an increase of all the tabetic symptoms, is suggestive and interesting.

Case II., A. S. P.—Although the original fever is said to have been typho-malarial. I give it as the connection between the original form and the secondary nervous disease is quite close.

It is a typical case of tabes, with all the classical symptoms. The disease is now well advanced (lightning pains, gastric crises, anæsthesia and loss of muscular sense of legs, ataxic gait, loss of knee-jerks, Argyll-Robertson pupils Romberg's symptoms, requires a cane for support, etc.)

In 1862, after a hard march in rain, was taken sick with high fever and diarrhœa; sent to Washington, where he was sick three months; was delirious; was told he had had typho malarial fever, and treated with large doses of quinine. It was six months before he was thoroughly restored to health so as to be able to resume business. About three months from the time he was first taken ill and while convalescing, gastric crises came on. Shortly after this be-

gan to suffer from pains in legs. He now suffers intensely from these gastric crises, which come on about once a month; formerly once in six months.

He also suffers from attacks of the following peculiar character, which are probably modified malaria. He is first taken with severe rigor; this is followed by diarrhœa and profuse sweating. He himself does not think he has fever, though he does not know what his temperature has been by the thermometer. His physicians have always pronounced these attacks (of which he has had eight or ten in the past eight years) to be malaria. Each time he is laid up from two to three weeks and is very sick each time.

No history of syphilis.

Case III., J. A. B.—This case is also one of well-marked tabes :—ataxic gait, static ataxia, tactile anæsthesia and analgesia of legs; knee-jerks lost, ataxia of hands (when writing), tabetic pains in legs and arms and across chest (girdle), pupils somewhat sluggish.

In July, 1863, he was taken with severe malaria and dysentery. The chills and fever were typical in their development. At first the attacks recurred as often as three times a day, then daily, and then every day or two for two months. For two months more he had them frequently, and up to December of that year they recurred at intervals. After the latter date they were replaced by dumb ague; that is, chills without subjective sensations of fever and only occasional sweating. These dumb-ague chills are often very severe. These he has suffered from ever since. In 1863 he was treated with very large doses of quinine. Last winter he had these typical attacks of chills and fever which were very severe, and which, to use the expression of the patient, "put him back just where he was in 1863."

He was discharged in April, 1864. Before his discharge he began to suffer from severe "sciatica," and soon after by severe pains down his arms, particularly right. The sciatic pains in the course of time became transformed into severe burning, boring pains in legs, which have persisted until the present day.

About fifteen years ago he first noticed a tendency to tumble in the dark, and at an earlier period, after getting tired; numbness of legs was first noticed about twelve years ago.

No history of syphilis.

Case IV., J. F. D.—Typical case of tabes in paralytic stage. The disease is at least of ten years' standing, as he has suffered from typical pains in legs for that length of time. (Examination shows anæsthesia and paralysis of legs, loss of knee-jerks, ataxic gait, loss of muscular sense in feet, Romberg's symptoms, Argyll-Robertson pupils, paralysis of bowel.)

History.—Contracted malaria during the war. Ever since has suffered from severe attacks of chills and fever, having them on an average six times a year.

No history of syphilis.

Case V., A. M.—The morbid process is well advanced. There is present severe tabetic pains, ataxia, loss of knee-jerks, anæsthesia and loss of muscular sense, atrophied optic nerves, color blindness, paralysis, Argyll-Robertson pupils, etc.

History.—In 1863 he had his first attack of malaria. At that time the chills and fever recurred for two months. He has had them from time to time ever since. The chills generally come on in the morning, and the fever follows in the afternoon or evening. He dates what were apparently his first tabetic pains from 1866; but the disease did not apparently become pronounced until five or six years ago.

No history of syphilis.

Case VI., E. E. H.—The usual signs of tabes are present. (Knee-jerks absent, Argyll-Robertson pupils, paroxysmal pains in legs, anæsthesia, staggers when walking with eyes shut.) First noticed a difficulty in walking eight years ago.

No history of syphilis.

Has suffered from chills and fever on an average once a

month ever since he had malaria during the war. He also has epileptic attacks.

GROUP II.—DISSEMINATED SCLEROSIS.

Case VII., F. E. S,—The most marked symptom is a fine intention tremor of both hands, particularly noticeable when drinking; hand-writing tremulous; paresis of right hand, which is noticeably weaker than left; slight atrophy of ball of right thumb and first interosseous; voice slightly tremulous; knee-jerks lively, but not abnormally so. He says his memory is poor.

History.—Had chills and fever while in a rebel prison in 1863, and has had them from that time until within a year. Sometimes they are very severe. The first nervous symptoms, in form of weakness of right arm, came on while in prison, after an attack of chills and fever. The tremor he has noticed "ever since he was exchanged from prison, but more especially for the past twenty years."

Case VIII., C. H. S.—The symptoms in this case are pronounced, viz.: moderately coarse intention tremor of hands and head; exaggerated knee-jerks and plantar reflexes; gait unsteady; legs spastic; Romberg's symptom; probably slight anæsthesia of legs (more subjective than objective; speech thick; pupils respond slightly only to light; mentally below par.

History.—Chills and fever while in the army. Has had them frequently ever since. Is laid up, he claims, one-half the time with them. I was unable to learn the exact time at which the nervous symptoms first appeared, excepting that it was at some time subsequent to the first attack of intermittent fever.

Case IX., D. W.—Marked coarse intention tremor of hands and head; drinks with difficulty from a glass; paresis; knee-jerks exaggerated; voice tremulous; ankle clonus.

History.—Had malaria in the army and still has attacks of chills and fever from time to time. Exact period of

development of nervous symptoms unknown but since he first had malaria.

Case X., H. C.—Disease well advanced.

Status præcens. Increased knee-jerks; ankle clonus; intention tremor of hand and head; voice tremulous; possibly very slight loss of sensation in feet; some paresis of hands and legs; Romberg's symptoms; gait ataxic; loss of muscular sense in legs; pupils respond poorly to light; easily tired; slight paresis of bladder; all symptoms marked; memory impaired.

History.—Contracted malaria in army in 1886, and has had attacks of chills and fever from time to time since. Had an attack in 1882, lasting five weeks. Tremor first came on eight or nine years ago, and has had difficulty in walking for four to five years. This patient's memory is poor, and he cannot give a precise account of himself; it is probable that the spinal disease has been of much longer duration than he is aware of.

Case XI., P. M. P.—Fine intention tremor of hands, weakness of limbs, slight ataxia of legs, Romberg's symptom, no anæsthesia; has also acute typical facial paralysis; knee-jerks exaggerated.

History.—Contracted malaria some years ago and still has attacks of chills and fever from time to time. The spinal symptoms followed the first malarial attack (history incomplete).

Case XII.—Dr. Putnam has communicated to me the details of a case to which he kindly allows me to refer. During convalescence from an attack of chills and fever, spinal symptoms developed, and the patient soon showed all the characteristic signs of disseminated sclerosis, which still persist.

Besides these cases I find in my record-book notes of seven others, three of disseminated sclerosis, two of tabes, one of an atypical spinal disease and one of lateral

sclerosis. Although a history of malaria existed in all three cases, my notes are not sufficiently full or explicit to render them valuable as evidence.

I desire, also, to emphasize the fact that these are not all the cases which have come to my notice. Several cases were observed before it seemed to be worth while to note them, and the notes of three other cases lately examined, have been lost owing to a misunderstanding.

I know that there are large gaps in the chain of evidence presented by these cases. It would have been more convincing if in a greater number it could have been shown that the spinal disease developed during the primary fever or immediately after during convalescence. But the length of time that has elapsed since the original attack of malaria in all these cases is so great and the development of disseminated sclerosis and tabes is so insidious that the memory of patients cannot be trusted to establish facts of this kind. Such early symptoms as paralysis of the iris, diminished or increased knee-jerks, slight degrees of ataxia, etc., are of course overlooked by the patients, and even more marked disturbances, such as tremor, slight degrees of anæsthesia, paralysis and neuralgia, either not noticed or ascribed to other than the true cause, as was the case in most of the cases here reported. In case I., for instance, in spite of the long-continued tabetic pains, nothing was thought to be the matter beyond chills and fever, until one day the patient tried to use his legs in an unusual way and found he had no control over them. For these reasons it is difficult to show, even if such be the case, that these chronic spinal diseases develop immediately after a malarial attack. On the other hand, such evidence must not be taken for more than it is worth. The secondary changes which are known to occur in other organs as sequelæ of malaria are not limited in turn to the primary attack. On the contrary, they are more apt to be found where malaria is chronic in the system and are insidious in their development. Parenchymatous nephritis, "amyloid degeneration of the kidney, liver and spleen, hæmorrhagic diathesis, scurvy, tuberculosis, malarial cachexia, etc," etc., may develop gradually in persons who are periodically subject to malaria.

The connection between tabes dorsalis and syphilis is well recognized, though the first symptoms of the former may not make themselves known until long after the primary attack. Now it is a noteworthy fact that syphilis and malaria resemble each other in one particular, namely, they are constitutional diseases in so far as the poison or germs may remain in the system for a long period of time and only show signs of its presence by volcanic-like outbreaks from time to time. In this respect malaria differs from the other fevers, like typhoid, small-pox, etc.; in these, if death does not take place, the poison is eliminated entirely and once for all from the system. Syphilis and malaria, too, may both fairly be said to be amenable to specific drugs, which is not true of the acute fevers. Now in the cases just reported there is one thing common to them all, and that is the patients were all continuously subject to malarial attacks and had been so for years; or, in other words, it is fair to presume that the malarial germs were still in the system. So that these cases are not simply to be looked upon as examples of nervous disease following a single acute attack of fever, such as might follow one of the acute exanthemata, *but rather as cases of nervous disease in persons who are at the same time infected with the malarial poison.*

In looking over the literature of the subject I can find very little in support of this ætiology.

Gowers, Ross, Charcot, Hamilton, Spitzka and Strümpel do not mention malaria in connection with either tabes or disseminated sclerosis. On the other hand, the latter disease has been met with by various observers after other acute febrile diseases, such as small-pox, typhoid, typhus, diphtheria, cholera, etc.; and tabes has been observed to follow typhus, diphtheria, typhoid, acute rheumatism and syphilis.

Erb, following E. Schulze, states that tabes may be caused by a predisposing influence, exerted by previous acute and chronic diseases (typhus, *intermittent fever*, and the like), whether occurring but once or repeatedly.

Tuezek has shown that a true tabes may be caused by the ergot parasite. The fact is that our knowledge of the

effect of poisons upon the nervous system is very fragmentary, and we may find that more diseases than we now imagine are due to unsuspected poisoning, zymotic or chemical, of one kind or another.

Putnam[2] has shown a remarkable association of different forms of nervous diseases with the previously unsuspected presence of lead in the system, and there is reason to believe that both arsenic and alcohol act upon the central nervous system as well as the peripheral nerves. Tabes has been attributed to absinthe, illuminating gas and other chemical poisons.

As to malaria, it is known that intermmittent paralysis, such as hemiplegia, anæsthesia, neuralgia resembling the crises of tabes, tremor, choreiform spasms,aphonia, insanity, amblyopia, and other disturbances of the nervous system, occur in persons infected with the poison, showing that the latter does have a direct effect upon the nervous system. The symptoms usually occur in the form of what is known as *masked* malarial fever, the attacks taking the place or following the typical chills and fever. These "masked" attacks usually "run their course without fever" (Hertz, in Ziem. Cyclo., vol. II.), or are only accompanied by partial febrile manifestations, as slight chilliness or heat with a rapid pulse or sweating. Hertz thinks they depend on an infection of certain nerve tracts, in the same way as the other portions of the central nervous system are affected in the typical attacks, with resulting chills, heat, dizziness, etc.

Eichhorst (Real-Encyclopædia) says that permanent insanity, paralyses, anæsthesias, contractures, etc., may occur as sequelæ of malaria.

If further investigations should show that the association of degenerative spinal disease and intermittent fever is more than a coincidence, the anatomical changes that are known to occur in the latter disease will easily render the connection intelligible. Brownish or slate-colored discoloration of the cortical portion of the brain, due to accumulations of pigment matter, has been found in those dying of

[2] Boston Med. and Surg. Journal, July 28, 1887.

pernicious malaria. According to Hesche, these collections of pigment matter are greatest in the spleen, liver, brain and spinal cord. Hyperæmia, œdema, and numerous punctiform extravasations and softening have been observed also. It would seem *a priori* that inflammatory foci might easily be set up from which secondary degenerations might follow, or the latter might be consecutive to the malarial cachexia, a rather indefinite conception.

I referred in an earlier paragraph of this paper to certain considerations which render the question one of great practical importance. It is this. You are aware that the soldiers in the late war are entitled by law not only to pension for the diseases or injuries contracted during military service, but for the disabiity resulting from the sequelæ of those diseases or injuries. Now the Government does not, I understand, recognize disseminated sclerosis, or tabes dorsalis, as sequelæ of malaria, and very numerous soldiers have had their pensions disallowed in consequence. If a true causal relation exists, it is apparent that much unintentional injustice has been done, and that it is important in the interests of many who are helpless from spinal disease, that the connection, if a true one, should be established. It would be well if neurologists who have an opportunity to study the effects of malaria and who have not had their attention drawn to cases of this kind would be on the lookout in the future for them.